Alessandro Casa

CONTACT INFORMATION

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RESEARCH INTERESTS

Latent variable models; Nonparametric statistics; Clustering; Density estimation; Computational statistics; Dimensionality reduction techniques; Graphical models; Chemometrics; Bayesian statistics.

CURRENT POSITION

Assistant Professor of Statistics (Junior)   since Jan. 2022
Faculty of Economics and Management, Free University of Bozen-Bolzano
Ricercatore SECS-S/01, Legge 240/10 tipo A

PAST POSITIONS

Postdoctoral research fellow (Level 2)   Nov. 2021 - Dec 2021
School of Mathematics and Statistics, University College Dublin
Affiliated with: Vistamilk SFI Research Centre
                Insight SFI Research Centre for Data Analytics
Supervisor: Prof. T.B. Murphy

Postdoctoral research fellow (Level 1)   Mar. 2020 - Oct 2021
School of Mathematics and Statistics, University College Dublin
Affiliated with: Vistamilk SFI Research Centre
                Insight SFI Research Centre for Data Analytics
Supervisor: Prof. T.B. Murphy

Research Assistant Pending Viva   Nov. 2019 - Feb. 2020
School of Mathematics and Statistics, University College Dublin
Affiliated with: Vistamilk SFI Research Centre
                Insight SFI Research Centre for Data Analytics

AWARDS, ASN, SCOLARSHIPS

- National Qualification for Associate Professor (ASN II fascia) in Statistics (SC 13/D1)   Jun. 2023
- *"PhD Student/Young Researcher Paper Award for outstanding contribution to the field of Classification, Clustering and Data Analysis"* at the 14th Scientific Meeting of the Classification and Data Analysis Group   Sept. 2023
- *"Best contribution by a young researcher"* at the 51st meeting of the Italian Statistical Society   Sept. 2022
- Doctoral Scholarship granted by University of Padova   2016-2019

EDUCATION

Ph.D. in Statistics   Oct. 2016 - Feb. 2020
University of Padova
Thesis: *Climbing modes and exploring mixtures: a journey in density-based clustering*
Supervisor: Prof. G. Menardi and Prof. J.E.Chacòn (co-supervisor)

Master degree in Statistical Sciences   Oct. 2014 - Sept. 2016
University of Padova
Final grade: 110/110 cum laude
Thesis: *Semi-supervised detection of collective anomalies using non-parametric methods with an application to particle physics* (written in italian)
Supervisor: Prof. G. Menardi

Bachelor degree in Statistics, Economics and Finance   Oct. 2011 - July 2014
University of Padova
Final grade: 110/110 cum laude
Thesis: *Dimension reduction for model-based clustering: a simulation study and an
        application to genetic data* (written in italian)
Supervisor: Prof. G. Menardi

VISITING PERIODS	**During the Ph.D. program** • University of Cote d'Azur, Laboratory J.A. Dieudonnè. Visiting scholar under the supervision of Prof. C. Bouveyron (Oct. 2018 - Dec. 2018) • University of Perugia, Department of Economics. Visiting scholar under the supervision of Prof. L. Scrucca (Apr. 2018) • University of Cambridge, Department of Pure mathematics and Mathematical Sciences. Visiting scholar under the supervision of Prof. R. Samworth (Oct. 2017 - Dec. 2017)

CONFERENCES PRESENTATIONS

Seminars
• Mathematics for Data Science, AI and ML Seminar Series
  Università di Trento   (May 2023)

• Working Group on Statistical Learning
  University College Dublin   (Feb. 2023)

• Statistics Seminar series
  Trinity College Dublin - Online   (Feb. 2022)

• Working Group on Statistical Learning
  University College Dublin - Online   (Feb. 2021)

• Vistamilk Spectroscopy Research Meeting
  Online   (Jul. 2020)

• Working Group on Statistical Learning
  University College Dublin   (Feb. 2020)

Invited talk
• CLADAG - Classification and Data Analysis Group 2023
  Salerno   (Sept. 2023)

• Working Group on Model-Based Clustering
  Pittsburgh, Carnegie Mellon University   (Jul. 2023)

• Workshop on Statistical Learning and Econometrics
  Bolzano   (Dec. 2022)

• CMStatistics 2022 - 15th ERCIM WG
  London   (Dec. 2022)

• Vistamilk Science Foundation Ireland Site Review
  Online   (Sept. 2022)

• ECDA - European Conference on Data Analysis
  Naples   (Sept. 2022)

• COMPSTAT 2022
  Bologna   (Aug. 2022)

• SIS - 51st Scientific meeting of the Italian Statistical Society
  Caserta   (Jun. 2022)

• CMStatistics 2021 - 14th ERCIM WG
  Online   (Dec. 2021)

• Vistamilk Annual Conference
  Online   (Mar. 2021)

- Vistamilk Science Foundation Ireland Site Review
  Online   (Oct. 2020)

- CLADAG - Classification and Data Analaysis Group 2019
  Cassino   (Sept. 2019)

- EMS - European Meeting of Statisticians
  Palermo   (Jul. 2019)

Contributed talk and Poster presentations
- Working Group on Model-Based Clustering
  Athens   (Oct. 2021)

- CLADAG - Classification and Data Analysis Group 2021
  Online   (Sept. 2021)

- SIS - 50th Scientific meeting of the Italian Statistical Society
  Online   (Jun. 2021)

- CASI - 41st Conference on Applied Statistics in Ireland
  Online   (May 2021)

- Working Group on Model-Based Clustering
  Wien   (Jul. 2019)

- ASPD - Workshop on Advanced Statistics for Physics Discovery
  Padova   (Sept. 2018)

- MBC2 - Model-Based Clustering and Classification
  Catania   (Sept. 2018)

- ECDA - European Conference on Data Analysis
  Paderborn   (Jul. 2018)

- SIS - 49th Scientific meeting of the Italian Statistical Society
  Palermo   (Jun. 2018)

- ISNPS - International Society for Nonparametric Statistics
  Salerno   (Jun. 2018)

- SIS - Intermediate conference of the Italian Statistical Society
  Florence   (Jun. 2017)

TEACHING AND SUPERVISION

Teaching Experience

Free university of Bozen-Bolzano
- Statistics for Tourism, Sports and Event Management - Teaching assistant (in italian)
  BSc in Tourism, Sports and Event Management, Academic year 2023/2024 (18hrs)

- High-dimensional Econometric Methods for Big Data - Lecturer (in english)
  PhD in Economics and Finance, Academic year 2022/2023 (8 hrs)

- Statistical Methods for Business Analysis - Lecturer (in english)
  MSc in Entrepreneurship and Innovation, Academic year 2022/2023 (54hrs)

- Statistics for Tourism, Sports and Event Management - Teaching assistant (in italian)
  BSc in Tourism, Sports and Event Management, Academic year 2022/2023 (18hrs)

- Statistics - Teaching assistant (in italian)
  BSc in Economics and Management, Academic year 2022/2023 (18hrs)

- Statistical Methods for Business Analysis - Lecturer (in english)
  MSc in Entrepreneurship and Innovation, Academic year 2021/2022 (52hrs)

University College Dublin
- STAT20060 - Statistics & Probability - Lecturer
  Level 2, Academic year 2019/2020.

- STAT30270 - Statistical Machine Learning - Teaching assistant
  Level 3, Academic year 2019/2020.

- STAT20060 Statistics & Probability - Teaching assistant
  Level 2, Academic year 2019/2020.

University of Padova
- *Bike sharing in Paris: a case study* (in italian).
  Specialist lecture during the class Statistica Iterazione
  Master degree, Academic year 2018/19.

Supervising Experience
Free University of Bozen-Bolzano
- MSc in Entrepreneurship and Innovation
  Isabel Franchini (main supervisor, 2023), David Bottai (co-supervisor, main supervisor: Alessandro Narduzzo, 2023)

University of Padova
- MSc in Statistical Science
  Giulia Pascali (co-supervisor, main supervisor: Giovanna Menardi, 2019)

RESEARCH PROJECTS

Participation to research projects
- "High-dimensional data analysis for environmentally sustainable decision-making",
  PON (MUR). PI: Prof. Davide Ferrari
  Position: Member of the research group (2022-2024)

- "Insight Science Foundation Ireland Research Centre for Data Analytics" (ref. no.
  SFI/12/RC/2289_P2). Scientific supervisor: Prof. Thomas Brendan Murphy
  Position: Member of the research group (November 2019 – December 2021)

- Vistamilk - Research grant from Science Foundation Ireland and the Department
  of Agriculture, Food and Marine on behalf of the Government of Ireland (grant
  16/RC/3835). Scientific supervisor: Prof. Thomas Brendan Murphy
  Position: Member of the research group (November 2019 – December 2021)

- "Approfondimenti su metodi di clustering basati sulla densità". Scientific Research
  Project DOR (prot. DOR1944143). PI: Prof. Giovanna Menardi
  Position: Member of the research group (2019)

- "Bandwith selection in nonparametric density estimation for clustering purposes".
  Scientific Research Project DOR (prot. DOR1898215). PI: Prof. Giovanna Menardi
  Position: Member of the research group (2018)

- "AMVA4NP - Advanced Multivariate Analysis for New Physics Searches at the Large
  Hadron Collider", Marie Sklodowska Curie - Innovative Training Network (Horizon
  2020). Scientific supervisor: Prof. Giovanna Menardi
  Position: Member of the research group (2016-2019)

EDITORIAL ACTIVITY

Referee for (alphabetically ordered)
- Advances in Data Analysis and Classification, Annals of Applied Statistics, Canadian Journal of Statistics, Computational Statistics and Data Analysis, Electronic Journal of Statistics, Food Analytical Methods, Journal of Computational and Graphical Statistics, Journal of Dairy Science, Journal of Royal Statistical Society: Series C, Journal of Statistical Software, Knowledge-based Systems, Mathematics, New England Journal of Statistics in Data Science, R Journal, Scientific Reports, Social Indicators Research, Stat, Statistical Analysis and Data Mining, Statistics and Computing, Statistics in Medicine, WIREs Computational Statistics.

ORGANIZATION OF SCIENTIFIC EVENTS

- Member of the organizing committee of the first edition of the *"Workshop on statistical learning and econometrics - Methodological advancements and applications"*
  (Bolzano, December 2022)

- Member of the organizing committe of the second edition of the *International Workshop on Spectroscopy and Chemometrics* (Dublin, April 2022)

- Academic Lead of the organizing committee of the inaugural edition of the *International Workshop on Spectroscopy and Chemometrics* (Online, April 2021)
- Member of the organizing committee of the monthly Vistamilk Spectroscopy research meetings (July 2020 - now)

INSTITUTIONAL ACTIVITIES

Membership to scientific societies
- Società Italiana di Statistica (SIS)
- Irish Statistical Association (ISA)
- young Italian Statistical Society (ySIS)
- young Irish Statistical Association (yISA)
- Research Group for Statistical Applications to Environmental Problems (GRASPA)
- Classification and Data Analysis Group (CLADAG)

Service to university
- Member of the Admission Board to the to the Master Degree Programme in "Data Analytics for Economics and Management" (2023 – Today)
- Member of the selection committee regarding evaluation and ranking of the applications concerning Teaching contract, Lecturing assistant and Teaching assistant positions. Free University of Bozen-Bolzano (Jan 2022 – Today)
- Elected representative of Ph.D. students and Postdoctoral researchers in the Faculty Board. University of Padova (2016–2020)
- Elected representative of Ph.D. students in the Doctoral Board of the Grad School. University of Padova (2016-2019)

Outreach Events
- Organising committee of the Math & Stats area at *"Le Mille e una scienza"*, a science festival in Bolzano specifically focused for the youths (Nov 2022)
- Took part to *"I'm a scientist - Get me out of here"*, event in Ireland connecting school students with scientists (Nov 2020)
- Notte europea dei ricercatori - University of Padova (Sept 2016 & Sept 2019)

EVENTS

- Start Up Research - Follow up   Jun. 2018
  Follow up meeting where the research groups present and discuss the scientific output of their works after one year of research
- Start Up research   Jun. 2017
  Meeting where small research groups of young scholars, advised by senior researchers, are asked to develop innovative methods and models to analyze a common dataset
- Stats Under the Stars 3   Jun. 2017
  Organizers: University of Florence, Italian Statistical Society
- Stats Under the Stars 1   Sept. 2015
  Organizers: University of Padova, Italian Statistical Society
- Data Science Game   Jun. 2015
  Organizers: Google, Capgemini

COMPUTER AND LANGUAGE SKILLS

Computer skills
- OS and Applications: Mac OS, Microsoft Windows, Linux, OpenOffice
- Programming languages: R (advanced), Python, SQL, Stata, SAS, C/C++
- Markup: LaTeX, HTML, Markdown

Language skills
- Italian: mother tongue
- English: C1
  (*Certificate of the Language center of the Free University of Bozen-Bolzano*)
- German: A2
  (*Goethe zertifikat*)

PUBLICATIONS

Working papers
- **Casa, A.**, Ferrari, D. & Huang, Z.
  A truncated pairwise likelihood approach for high-dimensional covariance estimation
- **Casa, A.**, Huang, Z. & Ferrari, D.
  Fast and efficient spatial covariance estimation in large datasets by composite likelihood truncation
- D'Angelo, S., Cappozzo, A., **Casa, A.**, & Fop, M.
  Robust Bayesian nonparametric model-based clustering
- **Casa, A.**, Murphy, T.B. & Fop, M.
  Penalized partial membership models for food authentication and detection of adulterated regions

Submitted preprints
- Cappozzo, A., **Casa, A.** & Fop, M. (2023+)
  Sparse model-based clustering of three-way data via lasso-type penalties
  `arXiv:2307.10673`
- Ferraccioli, F., **Casa, A.** & Stefanucci, M. (2023+)
  An adaptive functional regression framework for spatially heterogeneous signals in spectroscopy
  `arXiv:2309.06999`

Articles in refereed journals
- Frizzarin, M., Visentin, G., Ferragina, A., Hayes, E., Bevilacqua, A., Dhariyal, B., Domijan, K., Khan, H., Ifrim, G., Le Nguyen, T., Meagher, J., Menchetti, L., Singh, A., Whoriskey, S., Williamson, R., Zappaterra, M. & **Casa, A.** (2023)
  Classification of cow diet based on milk mid infrared spectra: a data analysis competition at the "International workshop on spectroscopy and chemometrics 2022"
  Chemometrics and Intelligent Laboratory Systems, 104755
- **Casa, A.**, Cappozzo, A. & Fop, M. (2022)
  Group-wise shrinkage estimation in penalized model-based clustering
  Journal of Classification, 39(3), 648-674
- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2022)
  Parsimonious Bayesian Factor Analysis for modelling latent structure in spectroscopy data.
  The Annals of Applied Statistics, 16(4), 2417–2436
- **Casa, A.** & Menardi, G. (2021)
  Nonparametric semi-supervised classification with application to signal detection in high energy physics.
  Statistical Methods & Applications, 31(3), 531–550
- Frizzarin, M., Gormley, I.C., **Casa, A.** & McParland, S. (2021)
  Selecting milk spectra to develop equations to predict milk technological traits
  Foods, 10(12), 3084
- Stakia, A., Dorigo, T., Banelli, G., Bortoletto, D., **Casa, A.**, de Castro, P., Delaere, C., Donini, J., Finos, L., Gallinaro, M., Giammanco, A., Held, A., Jimenez Morales, F., Kotkowski, G., Liew, S.P., Maltoni, F., Menardi, G., Papavergou, I., Saggio, A., Scarpa, B., Strong, G.C., Tosciri, C., Varela, J., Vischia, P. & Weiler, A. (2021)
  Advanced multi-variate analysis methods for new physics searches at the Large Hadron

Collider
Reviews in Physics, 7, 100063.

- Frizzarin, M., Bevilacqua, A., Dhariyal, B., Domijan, K., Ferraccioli, F., Hayes, E., Ifrim, G., Konkolewska, A., Le Nguyen, T., Mbaka, U., Ranzato, G., Singh, A., Stefanucci, M. & **Casa, A.** (2021).
  Mid infrared spectroscopy and milk quality traits: a data analysis competition at the "International Workshop on Spectroscopy and Chemometrics 2021"
  Chemometrics and Intelligent Laboratory Systems, 219, 10442

- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)
  Co-clustering of time-dependent data via the Shape Invariant Model
  Journal of Classification, 38(3), 626-649

- Frizzarin, M., O'Callaghan, T.F., Murphy, T.B., Hennessy, D. & **Casa, A.** (2021)
  Application of machine learning methods to milk mid infrared spectra for discrimination of cows milk from pasture or TMR diets
  Journal of Dairy Science, 104(12), 12394-12402

- Frizzarin, M., Gormley, I.C., Berry, D.P., Murphy, T.B., **Casa, A.**, Lynch, A. & McParland, S. (2021)
  Predicting dairy cow milk quality traits from routinely available milk spectra using statistical machine learning methods.
  Journal of Dairy Science 104(7), 7438–7447

- **Casa, A.**, Scrucca, L. & Menardi, G. (2021).
  Better than the best? Answers via model ensemble in density-based clustering.
  Advances in Data Analysis and Classification 15(3), 599-623

- **Casa, A.**, Chacón, J.E. & Menardi, G. (2020)
  Modal clustering asymptotics with applications to bandwidth selection.
  Electronic Journal of Statistics 14(1), 835–856

- **Casa, A.** (2018)
  On the choice of the weight function for the integrated likelihood.
  SM Journal of Biometrics & Biostatistics, 3(3), 1033

Discussions
- **Casa, A.**, Fop, M. & Murphy, T.B. (2021)
  Contributed discussion on: "Centered partition processes; informative priors for clustering" by Paganin, S., Herring, A.H., Olshan, A.F. & Dunson, D.B.
  Bayesian Analysis 16(1), 301–370

Book chapters
- **Casa, A.**, Cappozzo, A. & Fop, M. (2023).
  Penalized Model-Based Clustering with Group-Dependent Shrinkage Estimation.
  In: Building Bridges between Soft and Statistical Methodologies for Data Science. SMPS 2022. Advances in Intelligent Systems and Computing, vol 1433. Springer.
  https://doi.org/10.1007/978-3-031-15509-3_10

- Cabassi, A., **Casa, A.**, Farcomeni, A., Fontana, M., Russo, M. (2018).
  Three testing perspectives on connectome data.
  Studies in Neural Data Science, Springer Volume 'Proceedings in Mathematics & Statistics', ISBN-9783030000394.

Monographs
- **Casa, A.** (2020) Climbing modes and exploring mixtures: a journey in density-based clustering. PhD Thesis, University of Padova

Refereed conference proceedings
- **Casa, A.**, Murphy, T.B. & Fop. M. (2023)
  Partial membership models for high-dimensional spectroscopy data
  CLADAG 2023 - Book of Abstracts and Short Papers. ISBN: 9788891935632

- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2022)
  Unveiling patterns in spectroscopy data via a Bayesian latent variables approach
  Book of Abstracts, CFE-CMStatistics 2022, ISBN 978-9925-7812-6-3

- **Casa, A.**, Scrucca, L. & Menardi, G. (2022)
  Model ensemble in density-based clustering
  Programme and Abstracts, 24th International Conference on Computational Statistics (COMPSTAT 2022), ISBN 978-90-73592-40-7

- **Casa, A.**, Bouveyron, C., Erosheva, E. & Menardi, G. (2021)
  Model-based co-clustering of multivariate time-dependent data
  Book of Abstract, CFE-CMStatistics 2021, ISBN 978-9925-7812-5-6

- Cappozzo, A., **Casa, A.** & Fop, M. (2021)
  Model-based clustering with sparse matrix mixture models.
  CLADAG 2021 - Book of abstract and short papers.
  DOI: 10.36253/978-88-5518-340-6

- Cappozzo, A., **Casa, A.** & Fop, M. (2021)
  Penalized model-based clustering for three-way data structures.
  Book of short papers - SIS 2021. ISBN 9788891927361

- **Casa, A.**, O'Callaghan, T.F. & Murphy, T.B. (2021)
  Parsimonious modelling of spectroscopy data via a Bayesian latent variables approach.
  Book of short papers - SIS 2021. ISBN 9788891927361

- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2019)
  Asymptotics for bandwidth selection in nonparametric clustering.
  Cladag 2019 - Book of short papers. ISBN 9788883171086

- **Casa, A.** & Menardi, G. (2019)
  Nonparametric semisupervised classification and variable selection for new physics searches.
  EMS 2019 - Program and Book of Abstracts.

- Pascali, G., **Casa, A.** & Menardi, G. (2019)
  Co-clustering TripAdvisor data for personalized recommendations.
  Book of short Papers SIS 2019. ISBN 978889191510.

- **Casa, A.**, Scrucca, L. & Menardi, G. (2018)
  Averaging via stacking in model-based clustering.
  Book of abstracts of the 4th International Workshop on Model-Based Clustering and Classification (MBC2)

- **Casa, A.**, Scrucca, L. & Menardi, G. (2018)
  On the selection uncertainty in parametric clustering.
  Book of abstracts of the European Conference on Data Analysis (ECDA)

- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2018)
  On the choice of an appropriate bandwidth for modal clustering.
  Book of short Papers SIS 2018. ISBN 9788891910233

- **Casa, A.**, Chacòn, J.E. & Menardi, G. (2018)
  Clustering-oriented selction of the amount of smoothing in kernel density estimation.
  Book of abstracts - ISNPS 2018. ISBN 9788861970 007

- **Casa, A.** & Menardi, G. (2017)
  Signal detection in high energy physics via a semisupervised nonparametric approach.
  Proceedings of the Conference of the Italian Statistical Society "Statistics and Data Sciences: new challenges, new generations". ISBN 9788864535210

- **Casa, A.** & Menardi, G. (2017)
  Nonparametric semi-supervised classification with application to signal detection in high energy physics.
  Books of abstracts of the International Federation of Classification Societies (IFCS)